General

Guideline Title

Eastern Association for the Surgery of Trauma practice management guidelines for hemorrhage in pelvic fracture—update and systematic review.

Bibliographic Source(s)

Cullinane DC, Schiller HJ, Zielinski MD, Bilaniuk JW, Collier BR, Como J, Holevar M, Sabater EA, Sems SA, Vassy WM, Wynne JL. Eastern Association for the Surgery of Trauma practice management guidelines for hemorrhage in pelvic fracture--update and systematic review. J Trauma. 2011 Dec;71(6):1850-68. [86 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: EAST Practice Management Guidelines Work Group. Practice management guidelines for hemorrhage in pelvic fracture. Allentown (PA): Eastern Association for the Surgery of Trauma (EAST); 2001. 15 p. [34 references]

The Eastern Association for the Surgery of Trauma (EAST) reaffirmed the currency of this guideline in October 2016.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

The levels of recommendation (I-III) and classification of evidence (I-III) are defined at the end of the "Major Recommendations" field.

Which Patients With Hemodynamically Unstable Pelvic Fractures Warrant Early External Mechanical Stabilization?

1. The use of a pelvic orthotic device (POD) does not seem to limit blood loss in patients with pelvic hemorrhage. Level III Recommendation
2. The use of a POD effectively reduces fracture displacement and decreases pelvic volume. Level III Recommendation

Which Patients Require Emergent Angiography?

1. Patients with pelvic fractures and hemodynamic instability or signs of ongoing bleeding after nonpelvic sources of blood loss have been ruled out should be considered for pelvic angiography/embolization. Level I Recommendation
2. Patients with evidence of arterial intravenous contrast extravasation (ICE) in the pelvis by computed tomography (CT) may require pelvic angiography and embolization regardless of hemodynamic status. Level I Recommendation
3. Patients with pelvic fractures who have undergone pelvic angiography with or without embolization, who have signs of ongoing bleeding after nonpelvic sources of blood loss have been ruled out, should be considered for repeat pelvic angiography and possible embolization. Level II Recommendation

4. Patients older than 60 years with major pelvic fracture (open book, butterfly segment, or vertical shear) should be considered for pelvic angiography without regard for hemodynamic status. Level II Recommendation
5. Although fracture pattern or type does not predict arterial injury or need for angiography, anterior fractures are more highly associated with anterior vascular injuries, whereas posterior fractures are more highly associated with posterior vascular injuries. Level III Recommendation
6. Pelvic angiography with bilateral embolization seems to be safe with few major complications. Gluteal muscle ischemia/necrosis has been reported in patients with hemodynamic instability and prolonged immobilization or primary trauma to the gluteal region as the possible cause, rather than a direct complication of angioembolization. Level III Recommendation
7. Sexual function in males does not seem to be impaired after bilateral internal iliac arterial embolization. Level III Recommendation

What Is the Best Test to Exclude Intra-Abdominal Bleeding?

1. Focused Assessment with Sonography for Trauma (FAST) is not sensitive enough to exclude intraperitoneal bleeding in the presence of pelvic fracture. Level I Recommendation
2. FAST has adequate specificity in patients with unstable vital signs and pelvis fracture to recommend laparotomy to control hemorrhage. Level I Recommendation
3. Diagnostic peritoneal tap (DP)/Diagnostic peritoneal lavage (DPL) is the best test to exclude intra-abdominal bleeding in the hemodynamically unstable patient. Level II Recommendation
4. In the hemodynamically stable patient with a pelvic fracture, CT of the abdomen and pelvis with intravenous contrast is recommended to evaluate for intra-abdominal bleeding regardless of FAST results. Level II Recommendation

Are There Radiologic Findings Which Predict Hemorrhage?

1. Fracture pattern on pelvic X-ray does not single-handedly predict mortality, hemorrhage, or the need for angiography. Level II Recommendation
2. Presence/location of hematoma does not predict or exclude the need for angiography and possible embolization. Level II Recommendation
3. CT of the pelvis is an excellent screening tool to exclude pelvic hemorrhage. Level II Recommendation
4. Absence of contrast extravasation on CT does not always exclude active hemorrhage. Level II Recommendation
5. Pelvic hematoma >500 cm^3 in size has an increased incidence of arterial injury and need for angiography. Level II Recommendation
6. Isolated acetabular fractures are as likely to require angiography as pelvic rim fractures. Level III Recommendation
7. If a retrograde urethrocystogram is required, it should be performed after CT with intravenous contrast. Level III Recommendation

What Is the Role of Noninvasive Temporary External Fixation Devices?

1. Temporary pelvic binders (TPBs) effectively reduce unstable pelvic fractures as well as definitive stabilization and decrease pelvic volume. Level III Recommendation
2. TPBs may limit pelvic hemorrhage but do not seem to affect mortality. Level III Recommendation
3. TPBs work as well or better than emergent external pelvic fixation (EPF) in controlling hemorrhage. Level III Recommendation

Which Patients Warrant Retroperitoneal (Preperitoneal) Packing?

1. Retroperitoneal pelvic packing is effective in controlling hemorrhage when used as a salvage technique after angiographic embolization. Level III Recommendation
2. Retroperitoneal pelvic packing is effective in controlling hemorrhage when used as part of a multidisciplinary clinical pathway including a POD/C-clamp. Level III Recommendation

Definitions:

Classes of Evidence

Class I: Prospective randomized clinical trials.

Class II: Clinical studies in which data were collected prospectively or retrospective analyses based on clearly reliable data.

Class III: Studies based on retrospectively collected data.

Levels of Recommendation

Level I

This recommendation is convincingly justifiable based on the available scientific information alone. It is generally based on Class I data or strong

Class II evidence may form the basis for a Level I recommendation. Conversely, weak or contradictory Class I data may not be able to support a Level I recommendation.

Level II

This recommendation is reasonably justifiable by available scientific evidence and strongly supported by expert opinion. It is usually supported by Class II data or a preponderance of Class III evidence.

Level III

This recommendation is supported by available data, but adequate scientific evidence is lacking. It is generally supported by Class III data. This type of recommendation is useful for educational purposes and in guiding future studies.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Hemorrhage from pelvic fracture

Guideline Category

Evaluation

Management

Treatment

Clinical Specialty

Emergency Medicine

Orthopedic Surgery

Radiology

Surgery

Intended Users

Advanced Practice Nurses

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To update the previous guideline as well as to evaluate new treatment methods and techniques for hemorrhage due to pelvic fracture

- To address the following questions regarding the management of pelvic fracture hemorrhage:
  - Which patients with hemodynamically unstable pelvic fractures warrant early external mechanical stabilization?
  - Which patients require emergent angiography?
  - What is the best test to exclude extrapelvic bleeding?
  - Are there radiologic findings which predict hemorrhage?
  - What is the role of noninvasive temporary external fixation devices?
  - Which patients warrant preperitoneal packing (PPP)?

Target Population

Patients with pelvic fracture who have signs of bleeding (hemorrhage)

Interventions and Practices Considered

1. Pelvic orthotic device (POD)
2. Pelvic angiography/embolization
3. Focused assessment with sonography for trauma (FAST)
4. Diagnostic peritoneal tap (DP)/diagnostic peritoneal lavage (DPL)
5. Computed tomography (CT) of the pelvis
6. Pelvic x-ray
7. Retrograde urethrocystogram
8. Temporary binders (TPBs)
9. Retroperitoneal pelvic packing as part of multidisciplinary pathway

Major Outcomes Considered

- Risk factors associated with pelvic hemorrhage
- Sensitivity and specificity, accuracy, positive/negative predictive value of diagnostic procedures
- Treatment effectiveness

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

2011 Guideline

A computerized search of the National Library of Medicine MEDLINE database was undertaken using the OVID interface. English language citations were included for the period of 1999 through 2010 using the primary search strategy: pelvis, fracture, hemorrhage, trauma, and retroperitoneal hematoma. The dates were selected to allow comprehensive review of articles published since the prior systematic review with minimal overlap.

Review articles and case reports were excluded. Moreover, studies not directly addressing hemorrhage with pelvic fracture were excluded. The PubMed Related Citations algorithm was also used to identify additional articles similar to the items retrieved by the primary strategy. Of the 1,432 articles identified by these two techniques, those dealing with prospective or retrospective studies were selected, comprising 50 studies specifically evaluating hemorrhage associated with pelvic fracture in adult or pediatric patients.

2016 Reaffirmation

A comprehensive search of published medical literature was conducted from Jan. 2010 to Sept. 2016 using PubMed, OVID Medline, Cochrane Library and CINAHL databases using the following key words: "pelvis", "fracture hemorrhage", "trauma", and "retroperitoneal hematoma".

- Inclusion criteria: All articles with trauma-related pelvic hemorrhage and mortality as well as techniques to control hemorrhage from pelvic fracture.
- Exclusion criteria: Non-English language, non-trauma/injury related, editorials, opinion papers, case reports.

Number of Source Documents

2011 Guideline

50 studies

2016 Reaffirmation

73 studies

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Class I: Prospective randomized clinical trials.

Class II: Clinical studies in which data were collected prospectively or retrospective analyses based on clearly reliable data.

Class III: Studies based on retrospectively collected data.

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Articles were compiled by the committee chair and were distributed among committee members for formal review. Each article was entered into a review data sheet with detailed summaries of the articles. Deficiencies and conclusions not validated by the data were also noted. The reviewers correlated the references with the methodology established by the Agency for Health policy and Research of the US Department of Health and Human Service. Each reference was classified as class I, class II, or class III data. There was no class I data found for the search period. Fifteen class II articles and 35 class III articles were included in the review. An evidentiary table was constructed using the 50 references (see Table 2 in original guideline document).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

2011 Guideline

The workgroup for the Practice Management Guidelines for Hemorrhage in Pelvic Trauma consisted of nine Trauma Surgeons, an Orthopedic Surgeon specializing in trauma, and an Interventional Radiologist (see Table 1 in original guideline document).

Recommendations were classified as level 1, 2, or 3 according to the definitions listed in the "Rating Scheme for the Strength of the Recommendations" field.

Six questions regarding hemorrhage from pelvic fracture were addressed in formulating the recommendations:

1. Which patients with hemodynamically unstable pelvic fractures warrant early external mechanical stabilization?
2. Which patients require emergent angiography?
3. What is the best test to exclude extrapelvic bleeding?
4. Are there radiologic findings which predict hemorrhage?
5. What is the role of noninvasive temporary external fixation devices?
6. Which patients warrant preperitoneal packing?

2016 Reaffirmation

Articles were screened by a professional librarian by title and abstract, then salient articles were reviewed by a single reviewer (DC). Final article list (n=73) was fully reviewed and no articles were found to contradict the recommendations of the practice management guideline. Recent articles focused on the same topics address in the 2011 guidelines, with the same conclusions with the exception of resuscitative endovascular balloon occlusion of the aorta (REBOA) used for hemorrhage in pelvic fracture. These articles were small case studies with not enough data at this point to require an update of the management guideline.

Rating Scheme for the Strength of the Recommendations

Level I

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Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

All references were reviewed by at least two committee members for purposes of cross-validation.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate management of patients with hemorrhage in pelvic fracture

Potential Harms

- Patients with pelvic fractures treated with temporary pelvic binders may be at risk of developing pressure sores
- Complications associated with treatment such as over compression, recurrent bleeding, arterial injury at angiography

Qualifying Statements

Qualifying Statements

- The Eastern Association for the Surgery of Trauma (EAST) is a multi-disciplinary professional society committed to improving the care of injured patients. The Ad hoc Committee for Practice Management Guideline Development of EAST develops and disseminates evidence-based information to increase the scientific knowledge needed to enhance patient and clinical decision-making, improve health care quality, and promote efficiency in the organization of public and private systems of health care delivery. Unless specifically stated otherwise, the opinions expressed and statements made in this publication reflect the authors' personal observations and do not imply endorsement by nor official policy of the Eastern Association for the Surgery of Trauma.
- "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."* These guidelines are not fixed protocols that must be followed, but are intended for health care professionals and providers to consider. While they identify and describe generally recommended courses of intervention, they are not presented as a substitute for the advice of a physician or other knowledgeable health care professional or provider. Individual patients may require different treatments from those specified in a given guideline. Guidelines are not entirely inclusive or exclusive of all methods of reasonable care that can obtain/produce the same results. While guidelines can be written that take into account variations in clinical settings, resources, or common patient characteristics, they cannot address the unique needs of each patient nor the combination of resources available to a particular community or health care professional or provider. Deviations from clinical practice guidelines may be justified by individual circumstances. Thus, guidelines must be applied based on individual patient needs using professional judgment.

*Institute of Medicine. Clinical practice guidelines: directions for a new program. MJ Field and KN Lohr (eds) Washington, DC: National Academy Press. 1990: pg 39.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2011 Dec (reaffirmed 2016 Oct)

Guideline Developer(s)

Eastern Association for the Surgery of Trauma - Professional Association

Source(s) of Funding

Eastern Association for the Surgery of Trauma (EAST)

Guideline Committee

Practice Management Guidelines for Hemorrhage in Pelvic Trauma Workgroup

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Not stated

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Guideline Availability

Electronic copies: Available from the Eastern Association for the Surgery of Trauma (EAST) Web site .

Print copies: Available from the EAST Guidelines, c/o Daniel C. Cullinane, MD, Department of Surgery, Mayo Clinic, 200 First St, SW, Rochester, MN 55905; email: cullinane.daniel@mayo.edu.

Availability of Companion Documents

The following is available:

- Utilizing evidence based outcome measures to develop practice management guidelines: a primer. 2000. 18 p. Available in Portable Document Format (PDF) from the Eastern Association for the Surgery of Trauma (EAST) Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on February 27, 2002. The information was verified by the guideline developer as of March 26, 2002. This NGC summary was updated by ECRI Institute on May 10, 2013. The currency of the guideline was reaffirmed by the developer in October 2016 and the summary was updated by ECRI Institute on November 1, 2016.

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